Land Use and Carbon Storage in Eastern Deciduous Forests: Interactions Between Human Activities and Ecosystem Processes

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Changes in the economy can influence how forests are managed. Changes in forest management, in turn, may alter forest growth and carbon sequestration. To examine the ways in which socio-economic variables may influence carbon storage in the forests of central Appalachia, our interdisciplinary team will construct an econometric model that predicts the amount of biomass removed by species. These predictions will then be used in a calibrated ecosystem model (PnET-CN) to predict carbon storage under present and altered environmental conditions. The econometric model will be developed by Dr. Parker at George Mason University. More specifically, she will develop an inductive regression model that predicts the biomass removed by species as a function of the distance to population centers, population growth rates, income, land ownership, and a species economic value. The model will be parameterized and validated using existing data from 200 forest inventory and assessment (FIA) plots in the state of West Virginia that have been periodically measured by the US Forest Service. The ecosystem model will be calibrated by a graduate student (Briden) working with Dr. Thomas, and then used to predict carbon storage at two spatial scales – two small forested areas at the Fernow Experimental Forest, and 100 FIA plots located throughout West Virginia. The accuracy of model will be assessed by comparing its predictions to actual measurements of forest growth and carbon storage made at the Fernow Experimental Forest by Drs. Hessl & Peterjohn, and to periodic growth measurements made on the FIA plots by the US Forest Service. By successfully linking economic and ecosystem models, we hope to provide decision makers with a useful tool that will enable them to assess the net effect of how changes in the physical (e.g. climate change) and the socioeconomic (e.g. population change) environment can alter the capacity of forests to sequester CO_2 from the atmosphere.